REMARKS

Applicant wishes to thank the Examiner for reviewing the present application and the very comprehensive and clearly knowledgeable outline of art in the relevant field. However, the Applicant wants to put forward some different ways of looking at the application, and respectfully requests favorable reconsideration of this application in view of the following remarks.

Rejections Under 35 USC §112, Second Paragraph

The Examiner rejected claims 1-20 under 35 USC §112, second paragraph.

The Examiner rejected claim 1 on the ground that the phrase "the neutral components" lacked antecedent basis.

Paragraph 7 of the present application explains that "The soluble fraction of the slurry is separated into anionic and neutral fractions." Paragraph 8 explains that "The neutral fraction thus obtained is rich in inositol." Throughout the specification, there are numerous references to "neutral constituents" and "neutral compounds". Very simply the components of solutions can be clearly defined as either charged (molecules and atoms that bear a positive or negative charge) or neutral (molecules that do not contain a charged ionic group and do not bear a charge in solution). Inositol phosphates are examples of charged compounds that are highly soluble in water. Glucose, fructose, sucrose and inositol are all examples of uncharged neutral compounds that are highly soluble in water. As such the neutral components of the solution are clearly understood as non-charge bearing soluble compounds. The compounds will include glucose, fructose and sucrose which are very similar in size and structure to inositol. It is respectfully submitted that a person skilled in the relevant art would understand the meaning of "neutral" in this context, especially in the context of a sentence that includes the words "ionic" and "anionic", and that there is good antecedent basis in the specification.

The Examiner rejected claims 2-20 on the basis that they incorporated by their dependency on claim 1 the phrase "the neutral components". It is respectfully submitted that the argument above establishes that the phrase is meaningful and properly founded.

As claim 1 is the only independent claim in this application, and therefore crucial, the Applicant wishes to further elaborate on the invention in claim 1.

- Claim 1 clearly and definitely states that phytate in an aqueous slurry of plant material is partially hydrolyzed to inositol phosphate compounds using a phytase enzyme. The inositol phosphates (inositol monophosphate, inositol diphosphates and inositol triphosphates) contain negatively charged phosphate groups on the inositol ring. As such the inositol phosphate intermediate products of phytate hydrolysis are charged and are in solution along with neutral sugars such as glucose, fructose and sucrose.
- The charged state of the inositol phosphate compounds allow for ease of separation from neutral sugars in solution using separation techniques that are based on the physical property of electrical charge of the components of the solution.
- After the separation is complete, the ionic fraction containing inositol phosphates and other charged ions and molecules is subjected to full hydrolysis of the inositol phosphates to yield inositol plus inorganic phosphate. The net result is the formation of the neutral sugar inositol in a fraction containing charged compounds and ions.
- The neutral inositol compound can then be separated in a pure form from the charged components of the solution using charged based separation techniques.
- The physical properties of inositol (size and charge) are very similar that of common low molecular weight sugars such as glucose, fructose and sucrose that are present at high concentration in a slurry of plant materials. In fact the molecular weight of glucose and inositol are an identical 180 daltons. As such separation of inositol from solutions containing glucose and other simple sugars is difficult. The core of the invention is to utilize a method for the partial hydrolysis of phytate to charge intermediates, separate these intermediates form the neutral sugars in solution and then complete the full hydrolysis to neutral inositol that can be readily separated from charged ions and compounds.

Rejections Under 35 USC §112, First Paragraph

The Examiner rejected claim 2 on the basis that the specification does not provide enablement for a process of producing inositol from plant material using an phytase enzyme

that does not include acid phosphatase. Claim 2 simply states that the phytase enzyme cited in claim 1 does not include acid phosphatase. This is disclosed in paragraph 12 of, where it says "Thus, the source of phytase used preferably contains little or no acid phosphatase." A phytase containing enzyme product that also contains significant acid phosphatase would result in complete hydrolysis of phytate to neutral inositol during the first reaction step (claim 1a) which would not allow for the charged based separation described in the remaining steps in claim 1.

The Examiner states that it is known that purified phytase is effective in hydrolyzing phytate to inositol phosphate intermediates but less effective in completing the full breakdown to inositol. As described above, this is part of the invention disclosed in the application.

The examiner states that acid phosphatase will degrade inositol phosphates to inositol. The Applicants are well aware of this and in fact it is the separate use first phytase and then acid phosphatase in two distinct reactions that is integrated into the invention. This is clearly described in the disclosure and in the claims.

The examiner states on page 4 of the review that "Applicant is not enabled for producing inositol from plant material using a phytase enzyme which does not include acid phosphatase as instantly claimed." However, claim 1 clearly states that phytase is used for the *first* hydrolysis to inositol phosphate intermediates and *then* claim 8 clearly states that acid phosphatase is used to hydrolyze the inositol phosphate intermediates to inositol. The inventive distinction from the prior art is that the hydrolytic process are not carried in one reaction but in two distinct steps with a charged based separation of components of the solution between the steps.

The Applicant submits that it is possible to hydrolyze inositol phosphate intermediates to inositol using non-enzymatic procedures based on high temperatures and pressures. As such claim 1(c) is broadly stated to include all methods of hydrolysis. Dependent claims 8 and 10 then define specific means of completing the hydrolysis.

The Examiner states that the disclosure does not provide adequate guidance and that a large quantity of experimentation is necessary for others to practice the invention. However, the disclosure provides details of enzyme use and pH required for optimal enzyme activity. Charged based separation using ion exchange resins is among the oldest and simplest separation protocols and thus any practitioner skilled in the art can readily separate charged compounds and ions from neutral sugars using commercially available resins.

Rejections Under 35 USC §103(a)

The Examiner rejected claims 1, and 3-20, under 35 USC §103(a) as being obvious having regard to U.S. Patent Application No. 2001/0018197 by Wong *et al.* ("Wong"), in view of U.S. Patent No. 5,096,594 granted to Rabinowitz ("Rabinowitz").

Wong teaches the use of acid phosphatase and optionally phytase in a protein containing vegetable slurry followed by washing of the slurry to remove solubles to increase the protein content of the residue. Wong does not teach partial hydrolysis of phytate using a phytase, followed by a charged based separation, then hydrolysis of the ionic fraction to yield neutral inositol and then a second charged based separation to purify the inositol.

Rabinowitz teaches a separation of cyclitols, particularly inositol, from a mixture of sugars based on passage through a gradient chromatographic column using a DMSO:water gradient. Rabinowitz does not teach the use phytase followed by a charged based separation, then complete hydrolysis of the inositol phosphates in the ionic fraction and a final charged based separation to purify inositol. The disclosure of Rabinowitz describes a method of separation of similar neutral sugars within a mixture as opposed to prior separation of neutral sugars from charged inositol phosphates intermediates. The invention disclosed by the current application describes a distinct process that avoids the need for separating neutral inositol from a mixture of very similar neutral sugars.

The Examiner cited U.S. Patent No. 5,834,286 to Nevalainen *et al.* ("Nevalainen") "to relay an intrinsic property and is not used in the basis for rejection *per se.*" The Examiner did, however, mention a rejection of claims 1, and 3-20, under 35 USC §103(a) as being obvious having regard to Nevalainen in view of Wong, and further in view of Rabinowitz. The Applicant respectfully submits that Nevalainen is rather different from the present invention. Nevalainen teaches a recombinant combination strain that contains genes for phytase and acid phosphatase at a desired ratio to produce a final enzyme product with both phytase and acid phosphatase activities. It is true that this enzyme product can hydrolyze phytate to free inositol and inorganic phosphate. Nevalainen provides full details on the breakdown products of phytase and acid phosphatase activities and that a combination of the both activities can lead to full hydrolysis of phytate to inositol. This information is known to the Applicants and is acknowledged in the disclosure. However, Nevalainen does not teach a multi-step process involving (1) hydrolysis of the vegetable starting material, followed by (2) a charge-based separation, followed by (3) hydrolysis of

inositol phosphate intermediates in the ionic fraction and then (4) separation to yield purified inositol. Nevalainen does not mention separation at all.

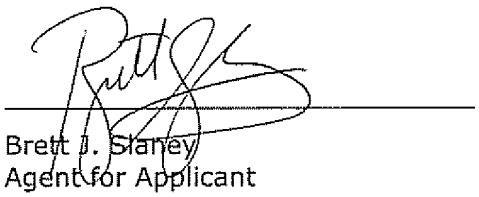
To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). See also MPEP §2143.03. As the combined teaching of Wong and Rabinowitz, with or without Nevalainen as further teaching, still does not teach all the claim limitations of claim 1, and hence of all dependent claims, it is respectfully submitted that Wong, Rabinowitz, and Nevalainen, singly or in combination, do not render any of the present claims obvious.

Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejections of claims 1 and 3-20 under 35 USC §103(a), relying on Wong and Rabinowitz.

In view of the foregoing, the Applicant respectfully submits that claims 1 to 20 are all enabled, novel and non-obvious, and are all allowable over the references cited.

Applicant respectfully requests the reconsideration of the rejections and allowance of the present application.

Respectfully submitted,



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